

**DEPARTMENT OF TRANSPORTATION  
FEDERAL AVIATION ADMINISTRATION**

E3WE Revision 8  HONEYWELL (AlliedSignal, Garrett, AiResearch)  TPE331-1 TPE331-1U TPE331-1UA TPE331-2 TPE331-2U TPE331-2UA  FEBRUARY 1, 2000
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**TYPE CERTIFICATE DATA SHEET NO. E3WE**

The engine models described herein conforming with this data sheet (which is part of Type Certificate No. E3WE) and other approved data on file with the Federal Aviation Administration meet the minimum standards for use in certified aircraft in accordance with pertinent aircraft data sheets and applicable portions of the Federal Aviation Regulations provided they are installed, operated, and maintained as prescribed by the approved manufacturer's manuals and other approved instructions.

TYPE CERTIFICATE (TC) HOLDER: Honeywell International Inc.  
111 South 34th Street  
Phoenix, Arizona 85034

Type Single-shaft turboprop with two-stage centrifugal compressor, three-stage axial turbine, and single annular combustion chamber.

Model No. (The letter "U" after the model dash number indicates that the engine air inlet is located above the propeller shaft centerline. Omission of the letter "U" after the model dash number indicates that the engine air inlet is located below the propeller shaft centerline.)

Ratings (see Note 3)	<u>TPE331-1, -1U, -1UA</u>	<u>TPE331-2, -2U, -2UA</u>
Max. continuous SHP	665	715
ESHP (see Note 4)	705	755
Output shaft speed, RPM	2000	2000
Exhaust gas temperature °F (°C)	1047 (564)	1072 (578)
Interstage turbine temperature °F (°C)	1638 (890)	1693 (923)
Takeoff (5 mins) SHP	665	715
ESHP (see Note 4)	705	755
Output shaft speed, RPM	2000	2000
Exhaust gas temperature °F (°C)	1047 (564)	1072 (578)
Interstage turbine temperature °F (°C)	1638 (890)	1693 (923)

Principal dimensions of basic engine

Refer to the Installation Drawing for each specific engine model configuration for dimensions and center of gravity location.

Weight, dry, pounds (see Note 14) 335 335

The engine weight shown herein is that of the power section and all components coded "E" in the Engine Equipment List.

Unit weights for items coded "A" in the Engine Equipment List are contained in the Engine Installation Manual IM-5111.

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Propeller-shaft to engine-rotor ratio

1:20.865

1:20.865

Fuels

Engine operation is approved with the following aviation turbine fuels:

- Honeywell International Inc. EMS 53111 (Type A)
- Honeywell International Inc. EMS 53112 (Type A-1)
- Honeywell International Inc. EMS 53113 (Class A-JP4 and Class B Type B)
- Honeywell International Inc. EMS 53116 (Type JP-5)
- British D. Eng. R.D. 2486 Issue 2
- British D. Eng. R.D. 2494 Issue 4
- ASTM D975 Grade 2-D, dated 1977 (No. 2 Diesel Fuel)

Diesel Fuel approval limited to TPE331-1-101Z engine only and usage at ambient temperatures above +15°F.

Aviation gasoline MIL-G-5572D, Grade 80/87, not in excess of 1000 gallons per 100 hours of operation, may be used for emergency fuel operation.

#### Fuel Additives

MIL-I-27686D or E Fuel System Icing Inhibitor, or an equivalent inhibitor, may be added in a quantity not in excess of 0.15 percent by volume, to fuels not containing anti-icing inhibitors.

Shell ASA-3 anti-static additive or equivalent, may be used in amounts to bring the fuel up to 300 conductivity units, but in no event shall the additive exceed 1 ppm.

Sohio Biodor JF Biocide Additive, or equivalent, is approved for use in the fuel at a concentration not to exceed 20 ppm of elemental Boron.

Oil	Oils conforming to Honeywell International Inc. Specification EMS 53110 (Type I and Type II).
Controls	(see NOTE 15)
Certification Basis	14 CFR Part 33 dated February 1, 1965, and Amendments 1, 2, and 3. Type Certificate No. E3WE issued December 14, 1967.
Production Basis	Production Certificate No. 413 issued March 4, 1965. Reissued as Production Certificate No. 413NM to Honeywell International Inc. on January 25, 2000.

NOTE 1. Maximum permissible temperature	<u>TPE331-1, -1U, -1UA</u>	<u>TPE331-2, -2U, -2UA</u>
Exhaust gas temperature, EGT		
Maximum continuous °F (°C)	1,047 (564)	1,072 (578)
Takeoff (5 minutes) °F (°C)	1,072 (578)	1,072 (578)
Inlet turbine temperature, ITT		
Maximum continuous °F (°C)	1,638 (892)	1,693 (923)
Takeoff (5 minutes) °F (°C)	1,693 (923)	1,693 (923)

The above takeoff and maximum continuous exhaust gas temperatures are for U.S. Standard Atmosphere sea-level static conditions, except when noted in the manual for Model TPE331-1, -1U, and -1UA versions at 80°F (27°C) ambient temperature, sea-level altitude, static condition. To maintain constant turbine inlet temperature, exhaust gas temperature will vary as a function of ambient conditions. Consult the manufacturer's operating manual for other than standard sea-level day conditions. The maximum exhaust gas temperature for engines equipped with EGT thermocouples for operation at 65 percent speed is 1400°F (760°C). During starting, the maximum exhaust gas temperature (EGT) is not to exceed 1500°F (815°C) or interstage turbine temperature (ITT) is not to exceed 2100°F (1149°C) for more than one second.

Oil inlet temperature      Minus 40°F (-40°C) to 260°F (127°C) for MIL-L-23699 type, and  
 Minus 40°F (-40°C) to 200°F (93°C) for MIL-L-7808 type.

Ambient air temperature      Minus 65°F (-54°C) to 125°F (52°C)

External engine components, surface temperature °F (°C):	<u>TPE331-1, -1U, -1UA</u>	<u>TPE331-2, -2U, -2UA</u>
Ignition leads	450 (232)	450 (232)
Igniter plugs	450 (232)	450 (232)

Thermocouple harness (EGT)	850 (454)	850 (454)
Thermocouple lead (ITT)	450 (232)	450 (232)
Fuel manifold	450 (232)	450 (232)
Start fuel manifold	450 (232)	450 (232)
Fuel shutoff valve	250 (121)	250 (121)
Fuel control assembly	265 (129)	265 (129)
Anti-icing valve, bleed air	610 (321)	610 (321)

## NOTE 2. Pressure limits

Inlet pressure	Sea level to 30,000 feet altitude except when noted in the manual for certain model TPE331-1, -1U, and -1UA versions at 35,000 feet.
Fuel pump inlet pressure, operational	5 psig plus true vapor pressure of fuel. Refer to IM-5111 for minimum normal operation limitations.
Oil pressure at inlet connection to the engine, minimum	2.45 psia
Oil operating pressure	70 to 120 psig at 100% speed 50 to 120 psig at 100% speed (above 23,000 feet altitude) 40 psig (minimum) at 65% speed (ground idle)

NOTE 3. The engine ratings are based on: Dynamometer operation at U.S. Standard Atmosphere, sea-level static conditions or when noted in the manual at 80°F (27°C) ambient temperature, sea-level altitude, static conditions. Compressor inlet air dry 59°F (15°C) or 80°F (27°C) whichever is applicable, 29.92 in. Hg., MIL-T-5624G-1, Grade JP-4 fuel with lower heating value of 18,400 btu per pound and MIL-L-23699A type oil, Mobile Oil Jet II. No bleed-air extraction, no anti-icing airflow, and no external accessory loads. Zero inlet loss. Exhaust gas discharging to ambient-static pressure through the turbine exhaust diffuser furnished with the engine. Measured exhaust gas temperature is indicated by the average of the exhaust gas temperature thermocouples (EGT) or measured interstage turbine temperature (ITT).

NOTE 4. Equivalent shaft horsepower (ESHP) for static conditions is based on:

$$ESHP = \frac{\text{Net thrust, pounds}}{2.5} + SHP$$

NOTE 5. Accessory drive provisions:

<u>Nominal Use</u>	<u>Type Drive (one each)</u>	<u>AND Drive Modifications</u>	<u>Rotation Facing Drive Pad and RPM</u>	<u>Speed Ratio, Drive to Engine Rotor</u>	<u>Maximum Torque (lb.-in.)</u>			<u>Overhung Moment (lb.-in.)</u>
					<u>T<sub>c</sub></u>	<u>T<sub>o</sub></u>	<u>T<sub>s</sub></u>	
Aircraft accessory	AND20001T ype XI-B (Modified)	Rotation, and RPM	CCW 3,959 rpm	0.09487	250	375	1650	125
Starter or starter-generator	AND20002T ype XIII-D (Modified)	RPM, T <sub>c</sub> , T <sub>o</sub> , and stud pattern rotation 30°	CW 10,887 rpm	0.26089	300	600	2200	500
Tachometer generator	AND20005T ype XV-B (Modified)	Shorter studs and thread lengths	CW 4,187 rpm	0.10033	7	-1	50	25 <sup>-1</sup>
Propeller governor	AND20010 Type XX-A (Modified)	RPM	CW 3,754 rpm	0.08995	125	188	--	125 <sup>-1</sup>

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Propeller pitch control	Mounting pad provided	--	--	--	--	--	30
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CW - clockwise

CCW - counterclockwise

-1 - Unspecified in AND Standard

T<sub>C</sub> - continuous torque

T<sub>O</sub> - torque overload

T<sub>S</sub> - static torque

RPM at 100 percent engine speed

NOTE 6. Up to 6 percent of the compressor nonbleed airflow is available for aircraft use during engine anti-icing operation and up to 8 percent is available without engine anti-icing operation.

NOTE 7. The maximum allowable power, as sensed by the torque sensor, in pound-feet, is:

	<u>TPE331-1, -1U, -1UA</u>	<u>TPE331-2, -2U, -2UA</u>
5 Minute Torque Limit	1,890	2,040
Maximum Continuous Torque Limit	1,746	1,878

NOTE 8. The maximum allowable propeller shaft speed is 2,100 rpm for a transient period not to exceed 5 seconds, and 2,020 rpm for 5 minutes. The normal output shaft speed is 2,000 rpm.

NOTE 9. MIL-I-27686D Fuel System Icing Inhibitor, or equivalent, is approved for use in fuels in amounts not to exceed 0.15 percent by volume.

NOTE 10. These engines meet FAA requirements for adequate turbine disc integrity and rotor blade containment and do not require external armoring.

NOTE 11. These engines meet FAA requirements for operation in icing conditions.

NOTE 12. Propeller shaft is bolted-flange type with clockwise rotation when viewed forward from the turbine exhaust.

NOTE 13. Shell ASA-3 Anti-Static Additive, or equivalent, in amounts to bring the fuel up to 300 conductivity units is permissible except that in no event shall the additive exceed 1 ppm.

NOTE 14. The TPE331-1UA and -2UA are identical to the TPE331-1U and -2U, respectively, except they have an aluminum gear box. This increases the weight of the engine 15 pounds but does not affect the C.G.

NOTE 15. Variations in engine configuration and installation components are identified by a suffix to the basic model number on the engine nameplate; i.e., TPE331-1-XY ("X" denotes Honeywell installed configuration rating code number(s) and "Y" denotes Honeywell equipment code letter(s) of aircraft manufacturer), and an Engine Equipment List Number. Certain features of these components are influenced by aircraft design considerations. In the Engine Equipment List, those items coded "E" are basic engine items and are controlled by 14 CFR Part 33. Items coded "A" have been demonstrated as compatible with the basic engine during engine certification testing. However, the operation, functioning, and rigging of these in a specific aircraft installation must be demonstrated during aircraft certification. Subsequent design change control associated with these factors is the responsibility of the aircraft manufacturer.

NOTE 16. Certain engine parts are life limited. These limits are listed in the FAA-approved Honeywell International Inc. Service Bulletin TPE-72-0019, dated December 4, 1972, or later FAA-approved revisions.

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